

TECHNOLOGY FOR REAL-TIME MEASUREMENT OF AIRBORNE AND SURFACE BERYLLIUM

TECHNOLOGY DESCRIPTION

This project is in the procurement stage. Once a contract has been awarded, the technology developer will develop a real-time, field-ready, prototype monitoring system for the near-instantaneous detection and measurement of both airborne and surface beryllium (Be) contamination. The monitoring data will be used as an alarm for personnel safety and for operational real-time decision making. Testing will be conducted under field conditions at an actual DOE site, Rocky Flats Environmental Technology Site (RFETS), to verify performance meets user specifications.

TECHNOLOGY NEED

The RFETS Site Technology Coordination Group (STCG) has identified an immediate need for real-time monitoring of airborne and surface beryllium contamination. These STCG needs are expressed in the STCG statements :

RF-DD15 - Real-Time Beryllium Surface Characterization

RF-DD16 - Real-Time Beryllium Air Monitoring:

If suitable instrumentation can be developed to yield real-time beryllium measurement results for the sample media, the Industrial Hygiene program at Rocky Flats can substantially reduce the risk of worker exposure and increase the productivity of those Deactivation & Decommissioning activities involving beryllium contamination. A key issue is the immediacy of this need.

Although not expressed in STCG needs statements, it is anticipated that several other DOE sites could benefit from real-time surface and/or beryllium air monitors. These sites include Hanford, Idaho, Rocky Flats, Oak Ridge, Sandia, Argonne, Los Alamos, Mound, Pantex, and Battelle Columbus, each of which has established its own beryllium exposure levels in response to the Interim Chronic Beryllium Disease Prevention Program that was issued through DOE Notice 440.1.

TECHNOLOGY BENEFITS

The capability to measure beryllium on surfaces will allow for more effective free release of property, and will aid in the determination of beryllium-contaminated work areas prior to potential worker exposure. A real-time monitor that can directly characterize surfaces and analyze surface samples will allow Rocky Flats to virtually eliminate sending beryllium surface samples off-site for analysis. Rocky Flats currently spends approximately \$22 per surface sample. This price must be reduced if real-time surface characterization is to be used on-site. The major drivers for this opportunity are cost reduction, worker safety, schedule compression, and waste minimization.

A real-time air monitor for beryllium could be utilized to improve worker safety by providing workers with an automatic 'alarm' function capable of alerting workers when airborne beryllium is present within the work area. Current practice is to analyze workers' filters for time-weighted averages of possible beryllium exposure. Reduced future liability and Personal Protective Equipment (PPE) requirements and improved job performance could also provide a significant cost savings benefit for the Site.

TECHNOLOGY CAPABILITIES/LIMITATIONS

The goal for the surface monitor technology is to be able to give real-time analysis of surface samples and/or give direct real-time readings of varying surfaces (i.e., concrete, steel, Plexiglas, and materials associated with building construction and equipment). The instrument should have sensitivity to levels of less than 0.2 micrograms of beryllium per 100 square centimeters ($<0.2 \mu\text{g Be}/100 \text{ cm}^2$), as defined by

the Rocky Flats free release limit. The monitor must be technically defensible so that free release will be a viable disposal option.

The goal for air monitor technology is to be able to measure all types of beryllium inhalation hazards, including salts, oxides, and metals. The monitor should also possess sufficient sensitivity, accuracy, and precision to verify meeting or exceeding action limits. The action limit for Rocky Flats is $0.2 \mu\text{g Be}/\text{m}^3$; the OSHA 8-hour time weighted average is $2.0 \mu\text{g Be}/\text{m}^3$; the OSHA peak is $5.0 \mu\text{g Be}/\text{m}^3$ (15-minute cumulative sample); and the OSHA ceiling is $25.0 \mu\text{g Be}/\text{m}^3$. A good lower detection limit at or near $0.1 \mu\text{g Be}/\text{m}^3$ would have implications relevant to reducing PPE requirements and the subsequent costs associated with disposal.



Several facilities in the Rocky Flats Environmental Technology Site (pictured above) contain significant beryllium contamination. An innovative technology is being developed to safely and efficiently measure and dispose of this contamination prior to site closure.

COLLABORATION/TECHNOLOGY TRANSFER

This Industry Programs (IP) project is managed by the National Energy Technology Laboratory (NETL) and is funded by the CMST-CP in collaboration with the Deactivation and Decommissioning Focus Area (DDFA) and RFETS. Once the technology developer (to be determined) has fabricated and calibrated a prototype monitoring system for airborne and surface beryllium contamination, the RFETS will work with the developer, NETL, CMST, and DDFA to demonstrate the technology at an applicable RFETS facility. If the monitor meets all of the end-user requirements, RFETS is committed to purchasing additional units to meet their needs. The entire project is expected to last 15 to 18 months.

ACCOMPLISHMENTS AND ONGOING WORK

The Commerce Business Daily Announcement for this solicitation was issued on January 12, 2000. The Request for Proposals (RFP) was issued on April 12, 2000. The contract award is anticipated in September 2000. The RFP was developed as a collaborative effort between NETL, CMST-CP, RFETS, and DDFA.

TECHNICAL TASK PLAN/TECHNICAL MANAGEMENT SYSTEM INFORMATION

TTP No/Title: FT00C251 - "Real-Time Beryllium Monitor for Surface and Air Samples"
Tech ID/Title: None

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